

Claims

- [1] A quantum dot light-emitting diode comprising a pair of top and bottom electrodes and a quantum dot light-emitting layer provided between the electrodes wherein an inorganic electron transport layer is formed between the quantum dot light-emitting layer and the top electrode.
- [2] The quantum dot light-emitting diode according to claim 1, wherein the diode comprises an anode, a hole transport layer, a quantum dot light-emitting layer, an inorganic electron transport layer and a cathode formed in this order on a substrate.
- [3] The quantum dot light-emitting diode according to claim 1 or 2, wherein the inorganic electron transport layer is made of an oxide selected from the group consisting of TiO_2 , ZnO , SiO_2 , SnO_2 , WO_3 , Ta_2O_3 , BaTiO_3 , BaZrO_3 , ZrO_2 , HfO_2 , Al_2O_3 , Y_2O_3 and ZrSiO_4 ; the nitride Si_3N_4 ; or a semiconductor compound selected from the group consisting of CdS , ZnSe and ZnS .
- [4] The quantum dot light-emitting diode according to claim 1 or 2, wherein the quantum dot light-emitting layer is made of a material selected from the group consisting of: Group II-VI compound semiconductor nanocrystals, including CdS , CdSe , CdTe , ZnS , ZnSe , ZnTe , HgS , HgSe and HgTe ; Group III-V compound semiconductor nanocrystals, including GaN , GaP , GaAs , InP and InAs ; PbS ; PbSe ; PbTe ; CdSe/ZnS ; CdS/ZnSe ; and InP/ZnS .
- [5] The quantum dot light-emitting diode according to claim 1 or 2, wherein the inorganic electron transport layer is formed by a solution coating process selected from the group consisting of sol-gel coating, spin coating, printing, casting and spraying, or a vapor coating process selected from the group consisting of chemical vapor deposition (CVD), sputtering, e-beam evaporation and vacuum deposition.
- [6] The quantum dot light-emitting diode according to claim 2, wherein the hole transport layer is made of a material selected from the group consisting of poly(3,4-ethylenedioxythiophene) (PEDOT)/polystyrene para-sulfonate (PSS) derivatives, poly-N-vinylcarbazole derivatives, polyphenylenevinylene derivatives, polyparaphenylene derivatives, polymethacrylate derivatives, poly(9,9-octylfluorene) derivatives, poly(spiro-fluorene) derivatives, N,N'-diphenyl-N,N'-bis(3-methylphenyl)-(1,1'-biphenyl)-4,4'-diamine (TPD), N,N'-di(naphthalene-1-yl)-N,N'diphenyl-benzidine (NPB), tris(3-methylphenylphenylamino)-triphenylamine (m-MTDATA), and poly(9,9'-dioctylfluorene-co-N-(4-butylphenyl)diphenylamine (TFB).